

TROUBLESHOOTING,

AND MAINTENANCE

OBJECTIVE



PREVENTATIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

PREVENTATIVE MAINTENANCE CHECKS AND SERVICES (PMCS) MEANS SYSTEMATIC CARING, INSPECTING AND SERVICING OF EQUIPMENT TO KEEP IT IN GOOD OPERATING CONDITION.

BE SURE TO PERFORM PMCS EACH TIME YOU OPERATE GLPS. ALWAYS DO PMCS IN THE SAME ORDER SO IT BECOMES HABIT.

ALWAYS KEEP IN MIND CAUTIONS AND WARNINGS.

PERFORM BEFORE (b) PMCS BEFORE YOU OPERATE.

PERFORM <u>DURING</u> (d) PMCS WHILE YOU OPERATE.

PERFORM AFTER (a) PMCS AFTER YOU OPERATE.

PERFORM ANNUAL (A) PMCS EACH YEAR.

IF THE EQUIPMENT FAILS TO OPERATE PROPERLY, TROUBLESHOOT FOLLOWING THE PROCEDURES OUTLINED IN TM 9-6675-347-13&P.

PMCS CAUTIONS

DO NOT IMMERSE ELECTRICAL/ELECTRONIC COMPONENTS IN WATER. IMMERSION WILL CAUSE DAMAGE TO ELECTRICAL/ELECTRONIC COMPONENTS.

DO NOT USE CHEMICALS FOR CLEANING, EXCEPT WHERE SPECIFIED BY TECHNICAL PUBLICATION. SOLVENTS CAN DETERIORATE PAINT, COATINGS OR LENS CEMENT.

TO PREVENT ETCHING OF GLASS SURFACES, DO NOT USE DIRTY OR ROUGH-TEXTURED RAGS TO CLEAN. DO NOT TOUCH OPTICS WITH FINGERS.

OPERATOR PMCS

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURE	EQUIPMENT NOT MISSION CAPABLE (NMC) IF:
1	b, a, A	GLPS	CHECK COMPLETENESS.	THEODOLITE/LRF, GYROSCOPE OR TRIPOD MISSING.
	a, A		INSPECT MECHANICAL PARTS FOR CLEANLINESS AND SERVICEABILITY. CHECK CONNECTORS FOR SERVICEABILITY.	MECHANICAL PARTS ARE BROKEN OR MISSING.
	A		CHECK ELECTRICAL PARTS AND CABLES FOR CRACKS, CUTS, DRY ROT, FRAYING, OR BREAKS IN INSULATION.	POWER CANNOT BE APPLIED TO OPERATE GLPS.
2		THEODOLITE AND		
	d, A	LASER RANGEFINDER	CHECK TO DETERMINE IF CIRCULAR LEVEL VIAL IS CRACKED OR BROKEN.	LEVEL VIAL IS BROKEN.
	d, A		CHECK THAT LOCKING LEVERS AND FINE ADJUSTMENT KNOBS FUNCTION AND FOR SMOOTH MOTION.	MOTION IS ROUGH OR PARTS ARE MISSING OR BROKEN.
	d, a, A		INSPECT OPTICS FOR CHIPS, CRACKS, CLARITY, AND CLEANLINESS.	CANNOT LAY HOWITZERS OR POSITION GLPS DUE TO FAULT IN OPTICS.
	d, A		CHECK THAT STANDING AXIS ROTATION IS SMOOTH.	ROTATION IS ROUGH.
	d, A		ADJUST TELESCOPE EYEPIECE DIOPTER.	RETICLE WILL NOT FOCUS.
	d, A		LOOK THROUGH TELESCOPE AND VIEW TARGET AT >30 METERS.	TARGET WILL NOT COME INTO FOCUS.

OPERATOR PMCS (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURE	EQUIPMENT NOT MISSION CAPABLE (NMC) IF:
3	А а, А	GYROSCOPE	PERFORM FIELD VERIFICATION USING SURVEY CONTROL POINT OR FIELD EXPEDIENT METHOD. CHECK CONTACTS FOR DAMAGE AND CLEANLINESS. IF DIRTY, CLEAN.	GYROSCOPE FAILS SYSTEM TEST. CONTACTS DAMAGED OR COMPLETELY CORRODED.
4	b, d, A a, A	BATTERY CHARGER AND BATTERIES	CHECK FUNCTION DURING CHARGING. CHECK CONTACTS FOR DAMAGE AND CLEANLINESS. IF DIRTY, CLEAN.	BATTERY CHARGER AND BATTERIES ARE MISSING OR INOPERATIVE. CONTACTS DAMAGED OR COMPLETELY CORRODED.
5	b, A	POWER ADAPTER	ATTACH POWER ADAPTER TO GYROSCOPE. CONNECT TO 10 – 33 VDC. POWER ON. PRESS ENTR TO CHECK DISPLAY ELEMENTS AND INPUT VOLTAGE ON THE THEODOLITE DISPLAY. CHECK DISPLAY AND KEYBOARD ILLUMINATION. CHECK CONTACTS FOR DAMAGE AND CLEANLINESS. IF DIRTY, CLEAN.	POWER ADAPTER IS MISSING OR INOPERATIVE. CONTACTS DAMAGED OR COMPLETELY CORRODED.

OPERATOR PMCS (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURE	EQUIPMENT NOT MISSION CAPABLE (NMC) IF:
6	d, A	TRIPOD	CHECK LEGS AND HINGES FOR ANY LOOSE PARTS. CHECK THAT MOTION OF LEVELING SCREWS IS SMOOTH. CHECK FUNCTION OF CLAMPING SCREWS.	NOT CAPABLE OF SETTING UP AND LEVELING THE SYSTEM.
7	A A	WINTERIZATION KIT	CHECK FOR MISSING COMPONENTS. CONNECT ELEMENTS TO POWER DISTRIBUTION BOX. CONNECT TO POWER SUPPLY. CHECK LED. IF LED IS ILLUMINATED, SYSTEM IS OPERATIONAL.	LED IS NOT ILLUMINATED.
8	b, A a, A	CONTAINERS	CHECK FUNCTION OF CLOSURES AND HANDLES. LEAVE OPEN UNTIL FOAM INSERTS ARE FULLY DRY.	

TROUBLESHOOTING PROCEDURES

THE TROUBLESHOOTING TABLE LISTS COMMON MALFUNCTIONS THAT MAY BE ENCOUNTERED DURING OPERATION OR MAINTENANCE OF GLPS.

TESTS AND INSPECTIONS SHOULD BE PERFORMED AS LISTED IN TM 9-6675-347-13&P.

IF MALFUNCTIONS ARE ENCOUNTERED THAT ARE NOT LISTED OR CORRECTED BY PROCEDURES IN THE TECHNICAL MANUAL, NOTIFY DIRECT SUPPORT MAINTENANCE.

IF EQUIPMENT DOES NOT FUNCTION PROPERLY, MAKE SURE YOU ARE OPERATING IT CORRECTLY. PAY PARTICULAR ATTENTION TO: LEVELING AND ADJUSTMENT OF THE CIRCULAR LEVEL.

JOLTS OR VIBRATION WHEN THE GYROSCOPE IS MEASURING.

POWER SUPPLY.

POWER CONSERVATION. THE SYSTEM SHUTS OFF AUTOMATICALLY WHEN IDLE AFTER 15 MINUTES, BUT RETAINS ALL DATA.

DURING OPERATION, BUILT-IN-TEST EQUIPMENT (BITE) MONITORS VARIOUS VITAL FUNCTIONS OF THE SYSTEM, TO INCLUDE GYROSCOPE, THEODOLITE, AND RANGEFINDER.

TROUBLESHOOTING - BATTERY CHARGER

MALFUNCTION	TEST OR INSPECTION REVEALS:	CORRECTIVE ACTION
POWER CONTROL NOT LIT.	NO AC OR DC POWER.	CHECK VOLTAGE SELECTOR. CHECK POWER CABLE. REPLACE FUSE (AC OR DC). POWER SWITCH ON-AC OR ON-DC.
CHARGE OR READY NOT LIT.	BATTERY NOT BEING CHARGED.	CLEAN CONTACTS. REPLACE FUSE.
BATTERY CHARGED NOT DISPLAYED AFTER MAXIMUM OF 14 HOURS CHARGING.	BATTERY CHARGER OR BATTERY DEFECTIVE.	TRY A DIFFERENT BATTERY ON SAME SIDE OF CHARGER. IF SAME PROBLEM OCCURS, CHARGER IS DEFECTIVE. IF SECOND BATTERY WORKS, FIRST BATTERY IS DEFECTIVE.

TROUBLESHOOTING - GLPS

MALFUNCTION	TEST OR INSPECTION REVEALS:	CORRECTIVE ACTION	
"WARNING BATTERY IS LOW" IS DISPLAYED. NOTE: WHEN "WARNING BATTERY IS LOW" IS DISPLAYED, THE OPERATOR SHOULD TURN THE	LOW POWER FROM BATTERY.	PRESS ENTR TO RETURN TO PROGRAM. COMPLETE CURRENT TASK. TURN GLPS OFF. CHANGE BATTERY AND CONTINUE MISSION.	
SYSTEM "OFF" BEFORE REMOVING AND REPLACING THE BATTERY. ONCE POWER IS RESTORED, THE DATA COLLECTED PRIOR TO SHUTDOWN IS RETAINED. IF THE BATTERY IS REMOVED WITHOUT PROPER SHUTDOWN PROCEDURES, DATA WILL BE LOST.	NO POWER FROM POWER ADAPTER.	CHECK EXTERNAL DC POWER. CHECK POWER CABLE. REPLACE FUSE. CLEAN CONTACTS.	
"BATTERY EMPTY" WARNING IS DISPLAYED.	NO POWER.	REPLACE BATTERY.	
"WARNING – GYRO DISTURBED (CHECK SETTINGS) IS DISPLAYED.	GYROSCOPE HAS DETECTED A FAULT IN THE SETTINGS.	PRESS ENTR TO RETURN TO PROGRAM. CHECK THAT HEMISPHERE SETTING IN CONFIGURATION IS CORRECT. CHECK THAT GLPS POSITION COORDINATES ARE CORRECT. CONTINUE THE MISSION.	
"WARNING – GYRO DISTURBED (VIBRATION) IS DISPLAYED.	GYROSCOPE HAS DETECTED VIBRATION THAT AFFECTS ACCURACY OF MEASUREMENT.	PRESS ENTR TO RETURN TO PROGRAM. DETERMINE CAUSE OF VIBRATION (VEHICLE PASSING, WIND, ETC.) AND CORRECT. IF WIND IS DETECTED, BLOCK WIND WITH BODY OR VEHICLE AND REMOVE COVER FROM TRIPOD LEG. CONTINUE THE MISSION.	
TARGET ROD DOESN'T WORK.	NO POWER OR BULB DEFECT.	CLEAN CONTACTS. REPLACE BULB. REPLACE FUSE.	

TROUBLESHOOTING - ERROR MESSAGE

WHEN AN ERROR MESSAGE IS DISPLAYED, PROCEED AS FOLLOWS:

- 1. PRESS ENTR TO CLEAR THE ERROR MESSAGE.
- 2. REPEAT THE OPERATION BEING PERFORMED AT TIME THE ERROR WAS DISPLAYED AND PERFORM GYRO SPIN.
- 3. IF THE ERROR MESSAGE IS REPEATED (1ST REPEAT), TURN GLPS OFF AND CHECK THE GYROSCOPE SEATING.
 - A. REMOVE THEODOLITE AND GYROSCOPE.
 - **B. ENSURE TRIPOD LEVELING IS CORRECT**
 - C. RESEAT GYROSCOPE, REATTACH THEODOLITE, AND ENSURE PRECISION LEVELING IS CORRECT.
- 4. TURN GLPS ON AND USE TESTING/BITE SCREEN TO VERIFY SYSTEM READINESS.
- 5. REPEAT OPERATION BEING PERFORMED WHEN ERROR MESSAGE WAS DISPLAYED.
- 6. IF THE ERROR MESSAGE IS REPEATED (2ND REPEAT), PERFORM THE FOLLOWING:

MALFUNCTION	TEST OR INSPECTION REVEALS:	CORRECTIVE ACTION
ERROR MESSAGE DISPLAYED:		
SYSTEM + MESSAGE	DEFECT IS ABOVE OPERATOR LEVEL	TURN IN GLPS.
THEODOLITE + MESSAGE	THEODOLITE DEFECT	TURN IN GLPS.
GYRO + MESSAGE	GYROSCOPE DEFECT.	TURN IN GLPS.
MRF + MESSAGE	LASER RANGEFINDER DEFECT.	TURN IN GLPS.
PLGR + MESSAGE	PLGR ERROR.	CHECK PLGR SETTINGS AND CHANGE AS REQUIRED. IF ERROR REPEATED, PROCEED TO PLGR OPERATOR MANUAL.

- 7. NOTE THE COMPLETE ERROR MESSAGE DISPLAYED AND THE OPERATION BEING PERFORMED AT TIME OF ERROR. (E.G., BACKPOLAR PLOT, AIM TO REFPT).
- 8. RECORD THIS INFORMATION ON THE DA FORM 2404.

FIELD VERIFICATION

FIELD VERIFICATION IS PERFORMED TO ENSURE CALIBRATION SETTINGS ESTABLISHED AND SET BY THE MANUFACTURER ARE WITHIN TOLERANCE.

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VERIFICATION IS REQUIRED:

UPON RECEIPT OF EQUIPMENT.

ANNUALLY.

WHEN GYROSCOPE OR THEODOLITE HAVE BEEN SUBJECTED TO ROUGH HANDLING WHEN NOT PACKAGED IN TRANSPORT CONTAINERS.

FIELD VERIFICATION - CAUTIONS

CAUTION

DO NOT ATTEMPT ANY REPAIRS OR ADJUSTMENTS BEYOND THOSE DESCRIBED IN THIS MANUAL. TURN THE EQUIPMENT IN TO THE APPROPRIATE MAINTENANCE ORGANIZATION.

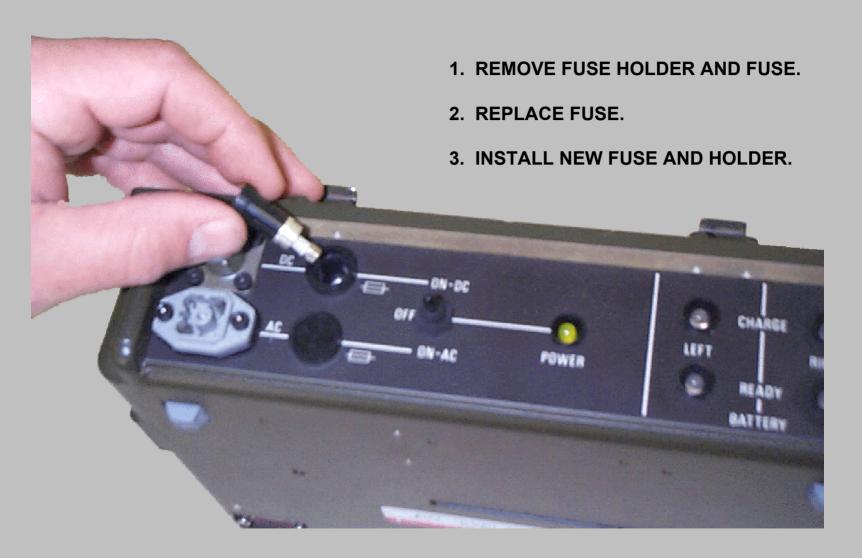
CAUTION

PRECISION IS ESSENTIAL TO ACCURATE VERIFICATION. ATTENTION TO DETAIL AND STRICT COMPLIANCE WITH SETUP AND MEASUREMENT PROCEDURES OUTLINED IN THIS MANUAL ARE REQUIRED.

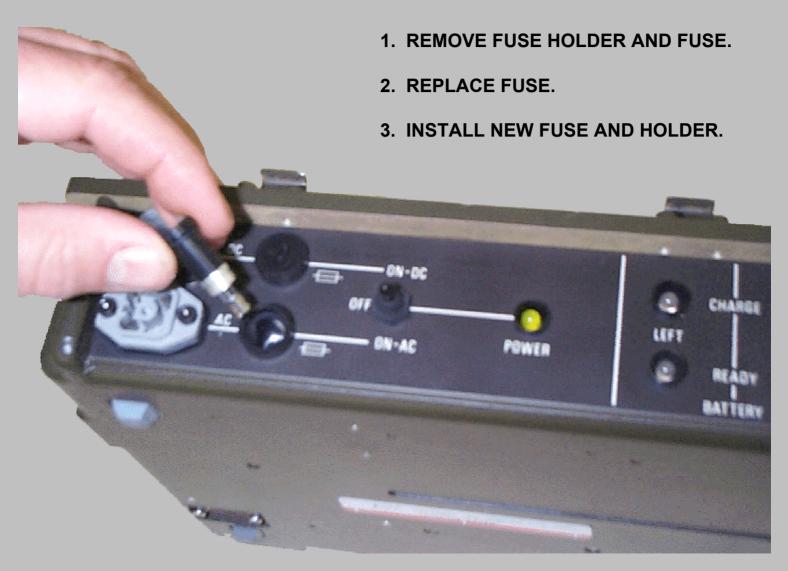
FIELD VERIFICATION PROCEDURES REQUIRE THE GLPS TO BE PLUMBED OVER THE SURVEY CONTROL POINT.

TO THE EXTENT POSSIBLE, ELIMINATE ALL DISTURBING ENVIRONMENTAL INFLUENCES AND FACTORS TO THE INSTRUMENT (E.G., WIND, VIBRATION, SOFT GROUND, AND HEAT WAVES)

MAINTENANCE - BATTERY CHARGER (DC FUSE)



MAINTENANCE - BATTERY CHARGER (AC FUSE)



MAINTENANCE - BATTERY



- 2. REPLACE FUSE.
- 3. INSTALL NEW FUSE AND HOLDER.

MAINTENANCE - POWER ADAPTER



MAINTENANCE - TARGET ROD

- 1. UNSCREW THE RED LIGHT FILTER FROM THE TOP OF THE TARGET ROD.
- 2. UNSCREW RETAINER AND REMOVE RETAINER AND OLD BULB.
- 3. INSTALL RETAINER AND NEW BULB.
- 4. REPLACE LIGHT FILTER ON TARGET ROD.





- 1. REMOVE FUSE HOLDER AND FUSE.
- 2. REPLACE FUSE.
- 3. INSTALL NEW FUSE AND HOLDER.

MAINTENANCE - THEODOLITE

- 1. REMOVE SCREW AND COVER.
- 2. INSTALL COVER AND SCREW.



MAINTENANCE - POWER SUPPLY DISTRIBUTION BOX

- 1. REMOVE FUSE HOLDER AND FUSE.
- 2. REPLACE FUSE.
- 3. INSTALL NEW FUSE AND HOLDER.



MAINTENANCE - GYROSCOPE

- 1. REMOVE SCREW AND COVER.
- 2. INSTALL COVER AND SCREW.





MAINTENANCE - TRIPOD

